These figures show that the supply of candidates is increasing. They also show that the large proportion of registered nurse training schools in New York State maintain a three year course.

One of the state hospitals is affiliating with a general hospital for one year's work for its pupils who hold cards of approval, and it would be to the advantage of all registered state hospitals to do the same. The most desirable plan is for the affiliation to be arranged with a view to having pupils take the general hospital work at the end of their junior year and return again to the home school for senior work. This would make the problem simpler for the hospital receiving the affiliation to give proper instruction as the pupils could then take up junior work, be promoted according to ability and the state hospital would reap some of the advantages of the affiliation in that it would have more efficient senior nurses.

The school which is complaining of a shortage of probationers had best look over its neighbor for there is strong suspicion that the neighbor may be making things so attractive for pupils that the students are entering there.

The answer to the cry for more pupils is improve your conditions, and more especially your teaching facilities. Women do not enter nursing primarily for comfort, but for knowledge, but if discomfort is so great that it interferes with the pursuit of knowledge, it will interfere also with the size of your preliminary class.

THE ADMINISTRATION OF MEDICINES

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(*Continued from page 194*)

THE ADMINISTRATION OF DOUCHES

Solutions used as douches are given to produce the following effects first, to act as an antiseptic on the vaginal secretions and to remove them; second, to contract the mucus membrane of the vagina and the cervix (astringent action); third, to check bleeding from the cervix or uterus; fourth, to lessen the pain produced by the contractions of the uterus and cervix. To produce any of these effects it is essential to have the solution come in contact with every part of the vagina and cervix, especially with the vaginal fornices where the secretions are most apt to accumulate. For this reason, the position of the patient

during the administration is very important. The patient should lie flat on the back with the thighs and legs flexed, and the douche should be given with a large glass nozzle containing a large number of holes at the tip but at different levels. With such a nozzle a spiral current of fluid is obtained, thus giving better drainage.

The temperature of the fluid should vary with the desired effect. For an antiseptic effect, for drainage or for an astringent action, the temperature should be that of the body, about 90° or 95°F. When given to check bleeding or to lessen uterine or cervical pain, the solution should be as hot as the patient can stand, since hot solutions are more apt to produce these latter effects than colder ones.

Rectal Administration for Local Effect. Solutions are injected into the rectum to expel its contents, either gaseous, fluid or solid (catharsis), and to affect a diseased condition of the mucus membrane of the rectum, sigmoid or descending colon.

To produce catharsis the object of injecting the fluid is to distend the bowel. The bowel will become distended up to a certain point, when peristaltic contractions of its muscle wall will result. These contractions will keep up until the bowel has been completely evacuated of its contents. To produce catharsis a return flow of the injected fluid is to be avoided. This is best accomplished by keeping the patient flat on the back with the buttocks slightly elevated and the thighs and legs flexed, and using a nozzle with only one hole at the tip. When it is desired to obtain evacuation of the sigmoid and the descending colon, these organs can be distended by placing the patient in the knee-elbow position.

Rectal Irrigations. Rectal irrigations are administered either to expel gas or fluid or to medicate the mucous membrane of the rectum, sigmoid and descending colon (irrigations rarely, if ever, reach the transverse or ascending colon). To accomplish these effects it is essential to obtain a return flow of the injected fluid. This is best done by siphoning the fluid by alternately elevating and lowering the irrigating bag. Each time the bag is lowered the nurse should see that at least the same amount of fluid is returned as has been injected, plus gas and fecal matter. Another excellent method of irrigating is to inject fluid into the rectum through Kemp's irrigating tube, which consists of an inflow and an outflow tube in one.

THE ADMINISTRATION OF REMEDIES FOR GENERAL EFFECT

Medicines are given hypodermically or by mouth to produce general effects; that is, to effect organs or tissues remote from the site of application. The object desired when administering such a remedy

is to have it enter the blood stream. The drug is then carried by the circulating blood until it reaches the particular organ or tissue for which it has a chemical affinity. There by the chemical combination of the drug with some of the constituents of the cells of the organ to be affected, certain desired changes in its activity are produced. For example when a dose of morphine sulphate is given to a patient to relieve pain, the morphine is dissolved in the gastric juice and then passes through the mucus membrane of the stomach into the blood stream. Here it is carried by the circulating blood stream until it reaches the cells of the gray matter of the brain which appreciate pain and for which morphine has a chemical affinity. The chemical combination of the morphine with these brain cells so changes their activity that they do not appreciate pain as readily as before and the patient then complains less of pain.

In order that the maximum desired effect shall be obtained from any remedy there are certain factors which the nurse must take into account in the administration of these remedies. I shall group these factors under the term of principles.

Basic Principles Underlying the Administration of Remedies for General Effects. (1) Desired Effect. (2) Efficiency of Action. (3) Taste. (4) Time of Administration.

Desired Effects. Remedies may be given by mouth either to produce a local effect on the stomach or intestines or for absorption into the blood stream. It is often essential for the nurse to know the effect that is desired from the remedy she is to administer, as the mode of administration will often vary with the desired effect. Thus many of the inorganic salts are often given either as cathartics or as diuretics. If given as a cathartic very little absorption of the salt is desired and the salt should be given in a very small quantity of water according to principles which we shall presently discuss. On the other hand, if the salts are given as diuretics, a maximum degree of absorption is desired and the salt should therefore be given in a large quantity of water.

Efficiency of Action. It is an axiom that the best way to administer any remedy is the one which will give the maximum desired effect. This can only be obtained when the remedy is given in such a manner as to readily enter the blood stream, and in such a state that it is capable of undergoing the greatest amount of chemical action.

Absorption. By absorption we mean a process whereby a given remedy enters the blood stream. To do this the drug must pass from the stomach or intestine through its mucous membrane and then through the walls of the intestinal capillaries into the blood of the veins. The

remedy is then carried in the blood stream. With hypodermic medication the remedy passes from the subcutaneous tissue into the blood vessels.

Absorption of a remedy is enhanced when it is in a fluid state and when the remedy has a comparatively simple chemical composition. The more solid the condition of the remedy and the more complex its chemical composition, the less it is absorbed.

Physical Chemistry of Remedies after Administration. Let us, for a moment, picture to ourselves what happens to a remedy after administration, for instance when it is given by mouth. As soon as the medicine enters the stomach, no matter whether it is given in a fluid or a solid form, it soon becomes dissolved in the gastric juice of the stomach, (in some instances in the intestinal juice). Furthermore, some remedies will also be digested by either the gastric or intestinal juice. Their condition, however, will not be changed except that the solution will contain substances of a simpler chemical construction and therefore those which are more readily absorbed.

The fate, then, of any remedy while it is dissolved in either the gastric or intestinal juices, and the way it is absorbed, will depend upon the laws of physical chemistry governing solutions.

Chemical Laws Governing Solutions. Any substance dissolved in another is capable of undergoing the following changes.

1. *Diffusion.* Diffusion is a process whereby one fluid is able to pass into another. Usually the more concentrated solution will pass into the less concentrated one until both contain the same ingredients in the same concentration. Thus, when we place a tube containing a solution of magnesium sulphate into a beaker containing a solution of sodium bicarbonate and allow the mixture to stand, we soon find that both solutions contain the same proportion of both magnesium sulphate and sodium bicarbonate. It is by the process of diffusion that solutions of drugs can pass into the gastric juice and it is by the same process that many remedies circulating in the blood stream can enter the cells of the various organs.

2. *Osmosis.* Osmosis is a quality which enables solutions to penetrate into another solution through an animal membrane. Thus the passage of various saline solutions from the intestines through the mucous membrane is due to the osmotic power of such solutions.

3. *Dissociation.* Dissociation is a process whereby a substance dissolved in a fluid will separate into two or more groups of atoms or molecules, which are capable of carrying electricity. Each group of atoms or molecules is called an ion. The one which carries positive electricity is called a *cation* and the one which carries negative elec-

tricity is called an *anion.* For example, if we dissolve sodium chloride in water, the sodium chloride soon becomes dissociated into groups of atoms of sodium which are charged with positive electricity and are called cations, and groups of atoms of chlorine charged with negative electricity or chlorine anions.

Chemical substances which exist in the state of ions, that is, which consist of groups of atoms or molecules capable of carrying electricity, are capable of the greatest amount of chemical action. For example, a remedy which exists in solution is capable of undergoing more chemical combinations with ingredients of the cells than is a solid substance which consists only of molecules or atoms.

Degree of Dissociation. The degree and rapidity with which a substance will separate (dissociate) into its ions will depend upon the following factors.

First, *The Nature of the Solvent.* By the solvent we mean the fluid in which a substance is dissolved. Different fluids have different powers of separating (dissociating) dissolved substances into ions. According to the degree and rapidity with which they separate dissolved substances into their ions, we can classify all fluids in which remedies are apt to be dissociated in the following order: a, weak acids; b, water; c, alcoholic solutions; d, syrups; e, colloids (albuminous solutions); f, oils. With the possible exception of lemonade and grape juice, weak acids are seldom used to administer medicines in. For practical purposes *water is the fluid in which dissociation takes place most readily.*

The alcoholic solutions commonly used as medicinal solvents are whisky, wines and beer. As a general rule, the smaller the percentage of alcohol present in the fluid, the more readily does the dissolved substance dissociate in it. With wines, and especially with beer, the dissociation does not take place as rapidly as is to be expected from the small amount of alcohol contained in these fluids, because of the other extraneous matter which these liquors contain.

In syrupy solutions, such as syrups and sugars, and in colloids, such as milk, dissolved substances separate very slowly into ions, if at all. With colloids such as albumins, when given by the mouth, the albumin may be digested by the gastric juice in the stomach so that the fluid becomes much simpler in its chemical structure and therefore has a greater dissociating power.

Oily solutions have a very small dissociating power.

From the foregoing principles we see that the fluid in which a remedy is to be administered will have a definite bearing upon the effect that is obtained from that remedy. Thus when we desire rapid effects from a remedy, it is better to administer it in a fluid like water where

it will be readily dissociated into its ions. When we desire slow or little absorption, it is better to administer the remedy in a fluid like milk where very slow dissociation takes place.

Second, *The Amount of Fluid.* The degree with which a substance dissociates into ions, when given in any fluid, will depend directly on the dilution of the fluid up to a certain point. Beyond this point, the degree of dissociation remains constant. Therefore *the more dilute the solution of the medicine, the more readily will it be dissociated into ions* and therefore, as we shall see later, the better and more rapid are its effects.

(*To be continued*)

IMPROVISING[1]

I

WAYS AND MEANS

By M. Elizabeth Pennington, *Niagara Falls, N. Y.*

While nursing in a small private hospital, the need arose to give saline solution by the Murphy method and with it the problem of proper apparatus. The hospital authorities contemplated building a larger institution and every available dollar was going toward that project so, of course, all unnecessary expenditures were impossible. It was necessary to improvise in many ways and to keep the saline hot was one of the things which demanded thought and consideration. Because of bitterly cold weather it was very hard to keep the wards warm enough for prolonged treatment, and while the dropping attachment was at hand, we lacked the heater so necessary to the success of a saline.

To begin with, I filled a tempered glass bottle with very hot water and put it into the solution in the douche can, which added very materially in maintaining an equalized heat. Next I fastened hot water bottles on the hooks of the irrigating pole and wrapped the whole in a single blanket. This kept the solution in the can hot for a reasonable length of time but I found that it cooled very quickly in flowing down the tube. To correct this it was necessary to place two uncovered metal hot water bags, so as not to come in contact with the patient, but in such a manner that the tube was incased without being compressed.

I found that this way out of the difficulty worked very satisfactorily and had excellent results from the treatment.

[1] Contributions to be used under this heading are solicited and, if found acceptable, will be paid for at our regular rates.—Ed.